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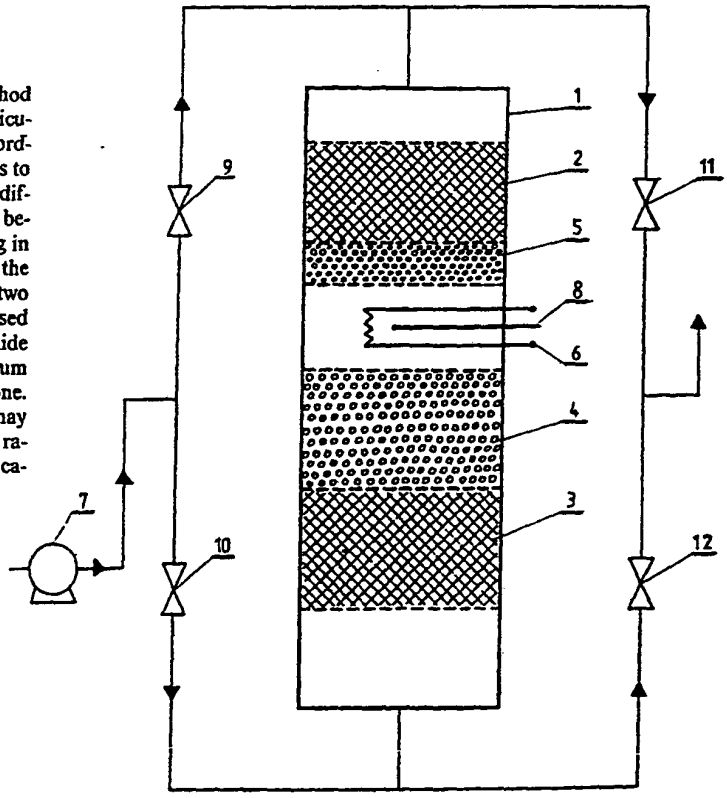
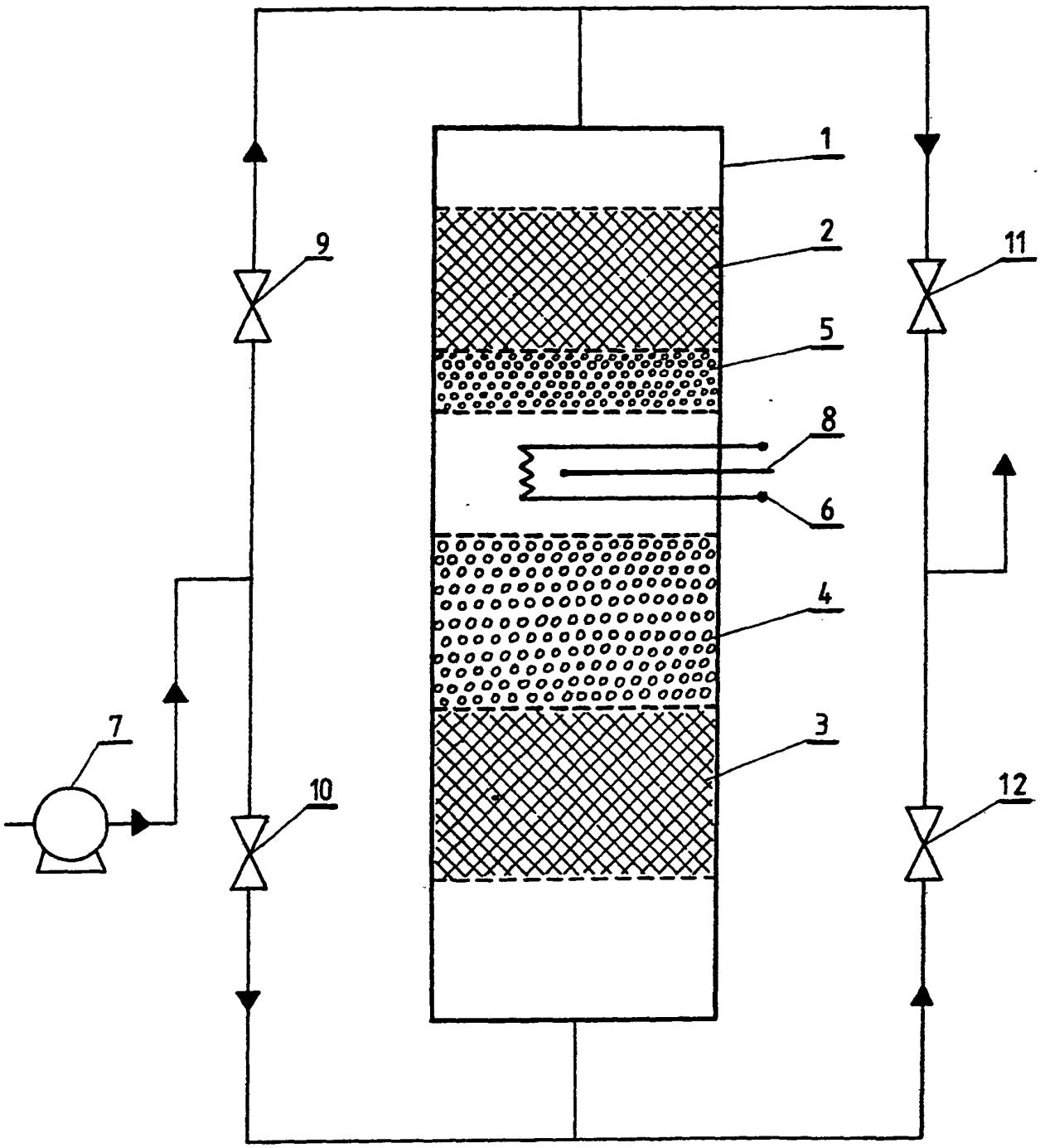
(57) Abstract

The subject of the invention is a method for catalytic reversion gas cleaning, in particular of organic admixture. The method according to the invention consists in that the gases to be cleaned through two layers of catalysts, differing each other in the activity, placed between the layers of heat accumulating filling in periodically variable directions, whereby the heat source is placed in the space between two layers of the catalyst. Platinum catalyst is used as one of the higher activity whereas an oxide one or a platinum one with a lower platinum contents are applied as a lower activity one. Moreover, the volumes of the both layers may differ from each other, whereby the volume ratio of the layer of more active to less active catalyst is at least 4:15.

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METHOD FOR CATALYTIC GAS CLEANING

The subject of the invention is the method for catalytic reversion gas cleaning, in particular of organic admixtures.

From the patent description of the Republic of Poland no 126861 it is known a method for gas cleaning in which the gas cleaned are periodically passed through two layers of the same catalysts, placed between two layers of a ceramic/metallic filling in two various directions, leading the heat necessary for starting a reaction in the central part of the apparatus.

In the processes of catalytic has cleaning usually two types of catalysts - platinum and oxide, are applied.

Platinum catalysts are more active, yet a few times more expensive than oxide ones.

It has been unexpectedly found that it is possible to discover a way of catalytic gas cleaning that might make use of positive features of both the catalysts, being deprived of their disadvantages.

It has been noticed it is possible to execute such an after-burning of gases in which the two kinds of catalysts are complementary to each other with advantages.

The matter of the invention consists in that the gases to be cleaned through two layers of catalytysts, differing from each other in activity, placed between the layers of heat accumulating filling in periodically variable directions, whereby the heat source is placed in the space between two layers of the catalysts.

Platinum catalyst is used as one of higher activity whereas an oxide one or a platinum one with a lower platinum content are applied as a lower activity one.

Moreover, the volumes of both the layers may differ from each other, whereby the volume ratio of the layer of more active to less active catalyst is at least 4:15.

It has been stated that if in the reversion method two catalyst layers are used, whereby one is of a relatively little volume and consisting of a high activity catalyst, while the other one is of a relatively big volume and consisting of a cheap and little activity catalyst, then both the layers have an activity close to that of the more active catalyst.

Moreover, the height of accumulating filing on the side of the less active catalyst may be higher or this heat accumulating filling may have a larger specific sur-

face.

Yet, the condition for high activity of both the catalysts is to place each kind of them in a separate layer, whereas between these layers a heat source should be placed. Then, the layer of the more active catalyst constitutes the trigger for all the system at a relatively low temperature. Starting a reaction in the layer of the more active catalyst causes heat to be given off, an increase of temperature in the second layer, as well, and its activation.

Following the way of the invention it has been unexpectedly found almost a full equivalence of the high and low activity catalysts.

The way following the invention has been experimentally tested in the apparatus presented in the figure.

In a o 250 mm cylindric rector 1 two layers of ceramic filling 2 and 3 are placed, the filling consisting of aluminosilicate granules of average o 6 mm diameter.

Between the ceramic layers 2 catalyst layers 4 and 5, are placed.

The layer of the more active catalyst 5 was 4 cm, whereas that of the less active 4 - 15 cm high.

Between both the catalyst layers there is a heat chamber in witch an electric heater 6 and a thermocouple 8, are placed.

Valves 9, 10, 11, 12 are closed in pairs, as well as opened this way, enabling thus periodical changes in the

gas flow directions, the gases being pumped by the fan 7 via the reactor 1.

Example I. (comparative) As catalyst in both the layers 4 and 5 granulated platinum catalyst described in a Polish patent no 146901 of platinum contents being 0.06%, was used. Through the reactor 120 m /h of air, containing 1,0 g/m of acetone, were passed through.

Valves 9 - 12 by opening and shutting in pairs caused a change in flow direction each 4 minutes. The electric heater took a power of 0.8 kW. It has been stated that when thermocouple 8 indicated about 270°C, conversion of acetone reached average 95%.

Example II.(comparative) Example I was repeated by using a copper-zinc catalyst described in a Polish patent no 57512, in lieu of platinum catalyst in both the layers. It has been analytically proved that acetone conversion at 270°C reached 25%. Whereas a 95% conversion was got at 350°C.

Example III. Example I was repeated by using a platinum catalyst in chamber 5, whereas a copper-zinc catalyst was applied in chamber 4. Acetone conversion at 270°C reached 93%, while at 283°C - 95%.

Similar results were gained while after-burning other organic compounds, like xylene, petrol and ethylene.

It has been found that conversion of these compounds reaching 95% occurred at temperatures fairly to each other, for both the platinum catalyst used in both the

layer platinum catalyst, whereas in the other cooper-zinc or another of low activity, were used. Used only an oxide catalyst, the temperature at which conversion reached 95% was higher by 50-100°C.

A similar relation was noted when in one layer platinum catalyst of 0.06 % Pt, while in the other of 0.03%, were used.

It was observed in other tests that while using both the kinds of catalysers at a lower ratio of more active one than it was in the experiments, activity of both the catalysts tends towards that of the more active one. Whereas, by diminishing the ratio of platinum to oxide or one of a reduced platinum level below 4:15, it was found that there occurs a rapid equalization of activities of both the catalysts to the activity of the more active oxide catalyst.

The way of running the after-burning process for air pollutions by the invention presented, allows to get at almost equivalent technical effects, and simultaneously lowers appreciably the gas cleaning costs by introducing a less active one, yet expensive.

Patent claims

1. The method for catalytic reversion gas cleaning that consists in passing polluted air in a periodically variable directions through two catalyst layers, placed between two heat accumulation filling layers, characteristic with that the mixture of pollution containing gases, especially in case of organic compounds, is passed through two layers of catalysts differing from each other in activity, whereby the heat source necessary for heating both the layers of catalysts is placed in the space between two catalysts is placed in the space between two catalyst layers.

2. The method according to claim 1, characterized in that one layer is made by a higher activity catalyst like a platinum one, whereas the other layer is made by a lower activity catalyst, like an oxide one.

3. The method according to claim 1 or 2, characterized in that a ratio of volumes of more to less active catalyst is at least 4:15.

4. The method according claim 1 or 2, characterized in that the height of the heat accumulation filling on

the side of the less active catalyst is higher than on the side of the more active one or the specific surface of this filling on the side of the less active catalyst is larger than on the side of the more active one.